2. 34.   The method of Claim 33 wherein drawing in the displayed first image the representation of the surgical object is in response to a user indicating at least one positioning parameter for the surgical object.

3. 35.   The method of Claim 34 wherein the at least one positioning parameter for the surgical object is defined in reference to the known coordinate frame.

4. 36.   The method of Claim 35 wherein the at least one parameter includes an approach angle of the surgical object.

5. 37.   The method of Claim 34 wherein the at least one parameter is defined in reference to the first image.

6. 38.   The method of Claim 37 wherein the at least one parameter includes a point in the body.

7. 39.   The method of Claim 37 wherein the user indicates the at least one parameter by positioning a cursor displayed within the first image.

8. 40.   The method of Claim 33 wherein a user indicates at least one parameter defining the surgical object.

43

9 41.   The method of Claim 40 wherein the at least one parameter includes a dimension of the surgical object.

10 42.   The method of Claim 33 further comprising:

registering to the known coordinate frame a second two-dimensional, image of the body's anatomy taken at a second observation angle;

displaying the second image; and

drawing in the displayed second image the representation of the surgical object based on the registration of the second image with the known coordinate frame.

11 43.   The method of Claim 42 wherein drawing the representation of the surgical object in the second image is in response to a user indicating on the displayed first image indicating a change in position of the representation of the surgical object in the first image.

12 44.   The method of Claim 33, wherein the representation of the surgical object is a virtual guidewire defining, at least in part, a trajectory of insertion of the surgical object into the body.

13 45.   The method of Claim 33, wherein the representation of the surgical object is a virtual guidewire having a length corresponding to a dimension of the surgical object to be inserted into the body.

44

46. The method of Claim 33 further comprising transmitting to a positioning mechanism coordinates for indicating the position of the surgical object represented in the first image.

47. The method of Claim 46 further comprising manipulating the positioning mechanism such that a guide coupled to the positioning mechanism is substantially aligned with the representation of the surgical object in the image.

48. The method of Claim 33 further comprising displaying information for indicating the position of the surgical object represented in the first image.

49. A computer readable storage medium encoded with instructions, which, when read by a computer, enable a computer to undertake a process comprising:

registering to a known coordinate frame a first two-dimensional, image of a body's anatomy taken at a first observation angle;

displaying the first image; and

drawing in the displayed first image a representation of a surgical object to be placed in the body based on the registration of the first image with the known coordinate frame.

45

50. The computer readable storage medium of Claim 49 wherein drawing in the displayed first image the representation of the surgical object is in response to a user indicating at least one positioning parameter for the surgical object.

51. The computer readable storage medium of Claim 50 wherein the at least one positioning parameter for the surgical object is defined in reference to the known coordinate frame.

52. The computer readable storage medium of Claim 51, wherein the indication of the at least one positioning parameter is a reference on the displayed first image controlled by a user.

53. The computer readable storage medium of Claim 49 wherein the process further comprises:

registering to the known coordinate frame a second two-dimensional, image of the body's anatomy taken at a second observation angle;

displaying the second image; and

drawing in the displayed second image the representation of the surgical object based on the registration of the second image with the known coordinate frame.

54. The computer readable storage medium of Claim 53 wherein drawing the representation of the surgical object in the second image is in response to an input received from a user indicating a position of the surgical object.

55. The computer readable storage medium of Claim 53 wherein drawing the representation of the surgical object in the second image is in response to an input received from a user indicating a position of the representation of the surgical object in the displayed first image.

56. The computer readable storage medium of Claim 53 wherein drawing the representation of the surgical object in the second image is in response to an input indicating a change in position of the representation of the surgical object in the first image.

57. The computer readable storage medium of Claim 53 wherein registering to the known coordinate frame the first image and the second image includes registering known coordinates of a plurality of fiducials within the reference frame with positions of the plurality of fiducials in the first and second images.

58. A computer-aided method for planning a surgical procedure comprising:

47

registering a first two-dimensional, image of a body's anatomy taken at a first observation angle with a second two-dimensional image of the body's anatomy taken at a second observation angle;

5   displaying the first image;

drawing within the displayed first image drawing within the displayed first image a representation of a surgical object to be placed in the body based on an input indicating a position of the surgical object;

displaying the second image; and

10   drawing in the displayed second image the representation of the surgical object.

59.   The method of Claim 58 wherein drawing the representation of the surgical object in the second image is based, at least in part, on positioning in the displayed first image of the representation of the surgical object in the first image.

60.   The method of Claim 58 wherein drawing in the first image and drawing second image the representation the surgical object is at least in part in response to a user indicating at least one positioning parameter for the surgical object.

61.   The method of Claim 60 wherein the at least one positioning parameter for the surgical object is defined in reference to a known coordinate frame to which the first and the second images are registered.

48

62. The method of Claim 60 wherein the at least one parameter includes an approach angle of the surgical object.

63. The method of Claim 60 wherein the at least one parameter includes a point in the body.

64. The method of Claim 60 wherein the user indicates the at least one parameter by positioning a reference displayed within the first or second images.

65. The method of Claim 58 wherein a user indicates at least one parameter defining the surgical object.

66. The method of Claim 58 further comprising transmitting to a positioning mechanism coordinates for indicating the position of the surgical object represented in the first image.

67. The method of Claim 66 further comprising manipulating the positioning mechanism such that a guide coupled to the positioning mechanism is substantially aligned with the representation of the surgical object in the image.

68. The method of Claim 58 further comprising displaying information for indicating the position within a known coordinate frame of reference for the surgical object for use in manually positioning a guide.

69. The method of Claim 58 wherein registering the first and second images includes registering a plurality of fiducials having known coordinates within a known coordinate frame of reference with images of the plurality of fiducials within in the respective first and second images.

70. A computer readable storage medium encoded with instructions, which, when read by a computer, enable a computer to undertake a process comprising:

receiving a first two-dimensional, image taken of a patient's body and a plurality of radio-opaque fiducials placed adjacent the body at known positions; and

registering the image by optimizing parameters of a known geometric model such that projections of the plurality of fiducials into the first image best fit positions of the plurality of fiducials in the image.

71. The computer readable storage medium of Claim 70, wherein the process further comprises:

receiving a second, two-dimensional image taken of the patient's body and the plurality of fiducials from a position different from the first image; and

5   registering the second image by optimizing parameters of the known geometric model such that projections of the plurality of fiducials into the second image best fit positions of the plurality of fiducials in the second image.

72.   The computer readable storage medium of Claim 71, wherein the process further comprises:

receiving input indicating on one of the first and second images a position of a representation of an imaginary object with respect to the body; and

5   drawing on the other of the first and second images a corresponding representation of the imaginary object projected into said other of the first and second images.

73.   The computer readable storage medium of Claim 72 further comprising:

receiving input indicating a change to a second position of the representation of the imaginary object within said one of the first and second image; and

redrawing within said other of the first and the second images the corresponding representation of imaginary object in the second position.

5   representation of imaginary object in the second position.

74.   The computer readable storage medium of Claim 72 wherein the imaginary object is a representation of a surgical object and the corresponding representation is also of the same surgical object.

43, 75. The computer readable storage medium of Claim 71, wherein the process further comprises:

receiving an input indicating a position of an imaginary object within the body; and

5   drawing on the first and the second images a representation of the imaginary object in the indicated position.

46. 76. The computer readable storage medium of Claim 75, wherein the process further comprises:

receiving an input indicating a change in the position of the imaginary object to a second position; and

5   redrawing in the first and the second images the representation of imaginary object in the second position.

45 77. The computer readable storage medium of Claim 70, wherein registering the image further comprises:

displaying the image; and

receiving an input from a user indicating on the image the position of each of the

5   plurality of fiducials within the image.

46 78. The computer readable storage medium of Claim 70, wherein the process further comprises linearizing the image before registering the image.

52

47 79.   A method comprising:

receiving a first two-dimensional, image taken of a patient's body and a plurality

of radio-opaque fiducials placed adjacent the body at known positions; and

registering the image by optimizing parameters of a known geometric model such

5   that projections of the plurality of fiducials into the first image best fit positions of the

plurality of fiducials in the image.

48 80.   The method of Claim 79 further comprising:

receiving a second, two-dimensional image taken of the patient's body and the

plurality of fiducials from a position different from the first image; and

registering the second image by optimizing parameters of the known geometric

5   model such that projections of the plurality of fiducials into the second image best fit

positions of the plurality of fiducials in the second image.

49 81.   The method of Claim 80 further comprising:

receiving input indicating on one of the first and second images a position of a

representation of an imaginary object with respect to the body; and

drawing on the other of the first and second images a corresponding

5   representation of the imaginary object projected into said other of the first and second

images.

56 82.   The method of Claim 81 further comprising:

receiving input indicating a change to a second position of the representation of the imaginary object within said one of the first and second image; and

redrawing within said other of the first and the second images the corresponding representation of imaginary object in the second position.

51 83.   The method of 81 wherein the imaginary object is a representation of a surgical object and the corresponding representation is also of the same surgical object.

52 84.   The method of Claim 80 further comprising:

receiving an input indicating a position of an imaginary object within the body; and

drawing on the first and the second images a representation of the imaginary object in the indicated position.

53 85.   The method of Claim 84 further comprising:

receiving an input indicating a change in the position of the imaginary object to a second position; and

redrawing in the first and the second images the representation of imaginary object in the second position.

54